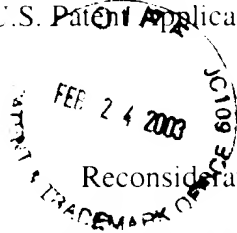


AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Patent Application No. 09/738,979



REMARKS

Reconsideration and allowance of the subject application are respectfully requested. By this Amendment, Applicant has added new claim 19. Thus, claims 1-19 are now pending in the application. In response to the Office Action (Paper No. 7), Applicant respectfully submits that the pending claims define patentable subject matter.

As a preliminary matter, Applicant thanks the Examiner for indicating that dependent claim 11 would be allowable if rewritten in independent form. However, Applicant respectfully requests the Examiner to hold in abeyance the rewriting of claim 11 until the Examiner has had the opportunity to reconsider the rejected parent claims in light of the arguments presented below in support of the Applicant's traverse of the rejection.

Claims 1, 2 and 5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki et al. (US Patent 6,147,725; hereafter "Yuuki") in view of Margerum et al. (US Patent 5,099,343; hereafter "Margerum"). Claims 1, 7-10, 13, 14 and 15 are 5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Taira et al. (US Patent 5,712,694; hereafter "Taira") in view Margerum. Claim 12 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Taira in view of Margerum and Miyashita et al. (US Patent 6,011,602; hereafter "Miyashita"). Claims 3 and 4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki in view of Margerum and Nakamura (US Patent 6,137,554). Claim 5 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki in view of Margerum, Nakamura and Taira. Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki in view of Margerum, Nakamura, Taira and Koike (US Patent 6,322,225). Claims 16-18 are rejected under 35 U.S.C. §

103(a) as being unpatentable over Yuuki in view of Margerum and Yokota et al. (USP 5,764,315; hereafter "Yokota"). Applicant respectfully traverses the prior art rejections.

In the Amendment filed July 10, 2002, Applicant argued that independent claim 1, as well as dependent claims 2-10 and 12-18, should be allowable because the primary references, Yuuki and Taira, do not teach or suggest a light source disposed on at least one side surface of a liquid-crystal display panel, as required by claim 1. In response the Examiner now alleges Margerum teaches this feature, and asserts that it would have been obvious to modify the display devices of Yuuki and Taira in view of Margerum to include a light source disposed on at least one side surface of a liquid-crystal display panel, as claimed.

Independent claim 1 recites a liquid-crystal display device comprising a transmission type liquid-crystal display panel including a liquid-crystal cell, a light source disposed on at least one side surface of the liquid-crystal display panel, and an optical path changing sheet disposed on a back side, opposite to a visual side, of the liquid-crystal display panel and having optical path changing slopes by which incident light from the light source is reflected toward the visual side of the liquid-crystal display device. For example, as shown in Figs 1 and 2, one embodiment of the invention includes a liquid-crystal display device comprising a transmission type liquid-crystal display panel L including a liquid-crystal cell 70, a light source 91, 93 disposed on at least one side surface of the liquid-crystal display panel L, and an optical path changing sheet 11 disposed on a back side of the liquid-crystal display panel L.

Because the light source is disposed on a side surface of a liquid-crystal display panel, the optical path of the transmission light is changed efficiently toward a visual side of the panel

through an optical path changing sheet disposed on the back of the panel. And the optical path changing sheet is excellent in thickness. Hence, the transmission light can be utilized for liquid-crystal display, and a liquid-crystal display device which is excellent in thickness and weight and which is bright and excellent in display quality can be formed.¹ Further, because the light source is disposed on at least one side surface of the liquid-crystal panel, increase in volume and weight (due to a light pipe) is avoided so that reduction in thickness and weight is achieved by the invention.²

Yuuki discloses a light source 13 that is disposed on a side surface of a light guide plate 11 rather than on a side surface of a liquid-crystal display panel unit 20 (formed by a TFT liquid crystal panel 21 and polarizing plates 16 and 17). See Fig. 3, for example. Light from the light guide plate 11 is then directed upward to the TFT panel 21 of the liquid-crystal display panel by a plurality of reflecting members 50a-50f arranged at a bottom part of the light guide plate, as shown in Fig. 3.

Similar to Yuuki, Taira (Figs. 14, and 15) discloses a light source 101 disposed on a side surface of a light guide plate 103 rather than on a liquid-crystal display panel (not shown). Light 112 emitted from the top of the light guide plate 103 is then made incident on a liquid-crystal panel by a saw-toothed light-reflecting boundary face 1306 of the light guide plate 103. See Taira at: col. 13, line 50 - col. 14, line 43.

¹ Specification at paragraph bridging pages 2 and 3.

² Specification at paragraph bridging pages 39 and 40. See also, the specification at: page 13, lines 4-11; page 14, lines 21-25; page 28, lines 9-13; and page 38, line 7 - page 39, line 14.

Margerum (Figures 1 and 2) discloses an edge-illuminated liquid crystal display device wherein optical lamps 34 and 36 are disposed on opposite sides of a liquid crystal display panel 12. Light emitted from the optical lamps 34 and 36 is reflected toward the front of the display panel 12 by a reflective surface or mirror 68 disposed on a back transparent face plate 32 of the display panel 12.

As the Examiner correctly notes, neither Yuuki nor Taira disclose a light source is disposed on the side surface of a liquid-crystal display. Rather, Yuuki teaches that the lamp 13 is disposed on the side of the light guide plate 31 having reflecting members 50a-50f. Similarly, Taira teaches disposed on a side surface of a light guide plate 103 having the saw-toothed light-reflecting boundary face 1306. Accordingly, it is not necessary to provide a separate optical path changing sheet to change the traveling direction of the light toward the visual side. On the other hand, according to the present invention, light emitted from the light source 91 is transmitted through the liquid-crystal display panel L for light transmission and the light is made incident on the optical path changing sheet 11 and reflected toward the visual side as shown in Fig. 1.

Accordingly, Applicant respectfully submits that one of ordinary skill in the art would not have been motivated to modify the display device of Yuuki or Taira to dispose a light source on a side of the liquid-crystal display panel and to add a separate optical path changing sheet.

In addition, although Margerum appears to be similar to the structure of present invention wherein light emitted from the light source is transmitted through the liquid-crystal display panel, the display device of Margerum utilizes a pair of transparent face plates 30 and 32 as a light guide where light is transmitted in the inside thereof. Moreover, the Margerum display

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device adopts a unique liquid crystal for changing the traveling path of the light. As shown in Figs. 4a and 4b and described in column 5, line 9-31, the light scattering is controlled by the electrical field and the alignment characteristics of the polymer itself. Accordingly, one of ordinary skill in the art would not have been motivated to provide an optical path changing sheet in the Margerum display device.

In view of the above, Applicant respectfully submits that independent claim 1, as well as dependent claims 2-18, should be allowable over the cited references.

By this Amendment, Applicant has added new dependent claim 19 which recites that "said light source is disposed in contact with said at least one side surface of said liquid-crystal display panel." Applicant respectfully submits that claim 19 should be allowable for the same reasons set forth with regards to independent claim 1 and because the cited references do not teach or suggest this feature of the claimed invention.

Reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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Respectfully submitted,


SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE



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PATENT TRADEMARK OFFICE


Christopher R. Lipp
Registration No. 41,157

Date: February 24, 2003

Attorney Docket No.: Q62369

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claim 19 is added as a new claim.

10/24/03
M19-3 7/03
10/24/03